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IDF Diabetes Atlas

Diabetes in South and Central America: An update

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ABSTRACT

The estimated population of the South and Central America (SACA) Region is 467.6 million and 64% is in the age range of 20–79 years but the population pyramid and age distribution are changing. The average prevalence of diabetes in the Region is 8.0% and is expected to reach 9.8% by the year 2035. Prevalence is much lower in rural settings than in urban and the differences attributed to lifestyle changes may be a target for intervention. The indigenous population is a particularly vulnerable group needing special attention. On average, 24% of the adult cases with diabetes are undiagnosed but in some countries this is still as high as 50%. Health expenditure due to diabetes in the Region is around 9% of the global total. Inadequate glycemic control, defined as HbA1c >7%, is a strong predictor of chronic complications which increase resource use in the Region and less than half of the patients enrolled in diabetes care programmes are at target. Fifty percent or more of the adult population is overweight/obese and around one third of the adult population has metabolic syndrome using regional cutoffs for waist circumference. The number of people with IGT is almost equal to those with diabetes presenting an additional challenge for prevention. Children with type 1 diabetes represent only 0.2% of the total population with diabetes but the incidence may be increasing. In many places they have limited access to insulin, and even when available, it is not used appropriately. The available epidemiological data provide the background to act in developing national diabetes programmes which integrate diabetes care with cardiovascular prevention and promote diabetes prevention as well.

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1. Introduction

Diabetes is now a global epidemic which represents a considerable health and socioeconomic burden. To understand its regional impact it is necessary to know the characteristics of the population that may explain the differences in diabetes epidemiology and care within the region and between regions. The IDF South and Central America Region (SACA) represents a diverse population of ethnicities and countries in various stages of development. Changes in those countries over the next generation will lead to increases in diabetes prevalence and present a burden for health systems.

2. Demographic profile

The SACA Region is comprised of 20 countries (11 in South America, 6 in Central America and 3 in the Caribbean islands). All of them, except French Guiana, belong to what is recognized as Latin America which also includes Mexico (not part of SACA). Ethnicity in the region is an admixture of Europids (mainly Iberian), Amerindians and Sub-Saharan Africans. Mestizo (admixture of white and Amerindian) is the predominant ethnic group in most of the region (it has been compared to the Hispanic group in the US) but there is a wide variation in the ethnic composition: in some Countries such as Argentina and Uruguay more than two thirds of the population is considered Europid, and in others such as Bolivia and Guatemala there is a high proportion of Amerindians (almost 50% in the latter). There is also a considerable proportion of black population in Brazil, Dominican Republic and Panama (>10%). The estimated population in 2013 was 467.58 million and 64% lies in the age range of 20–79 years. The age distribution is shifting towards an older average age across the Region but not at the same rate in all the countries [1]. The proportion of older people (≥65 years) is more than 10% in Argentina, Chile, Cuba, Puerto Rico and Uruguay, but less than 5% in Bolivia, French Guiana, Guatemala, Honduras, Nicaragua and Paraguay. In these latter countries, one-third or more of the population is under 15 years of age.

There are big disparities in the standard of living between and within countries in the SACA Region; people living in the south cone (Argentina, Chile) have the highest GDP per capita (almost 20,000 USD) compared to less affluent countries such as Bolivia, Honduras and Nicaragua whose GDP is less than one fourth of that [2]. The same can be said of health expenditure: in 2011 the health expenditure per capita was more than USD 1000 in Brazil, Chile and Uruguay but less than USD 200 in Bolivia, Honduras and Nicaragua. The mean life expectancy at birth in the SACA Region is 72 (range 65–77) years for men and 78 (range 69–81) years for women. The life expectancies at age 60 are 20 (range 17–23) years and 23 (range 19–25) years respectively [3,4].

3. Prevalence of diabetes

The prevalence of diabetes reported in the new edition of the IDF Diabetes Atlas for the adult population (20–79 years) in the SACA region is 8.0% which translates into over 24 million people with diabetes (Table 1) [5]. It is expected to reach 9.8% by the year 2035 which means that the number of people will increase by 60% (Table 1). The prevalence shows a four-fold variation between countries in the Region. Puerto Rico has the highest prevalence (15.4%,) and Peru has the lowest value (4.3%). Interestingly, the top five Countries with the highest prevalence are in Central America (Nicaragua, Guatemala, El Salvador) and in the Caribbean Islands (Puerto Rico, Dominican Republic) (Table 2). When the total population is considered, the top five countries with the highest number of adults with diabetes are Brazil, Colombia, Chile, Argentina and Venezuela which correspond to the most populous countries; only Peru is not in the top countries for diabetes despite having a large population (Table 3).

Although the data sources were carefully selected and scored based on representation, study design, sample size, study age, diagnostic criteria and publication type and adjusted to variables such as age and urbanization [6], some of the differences seen with data currently used in some countries may be attributed to methodology and there are still countries where reliable data is missing. For example, estimates for Cuba, El Salvador, French Guiana, Panama, Paraguay and Uruguay were based on extrapolation from countries matched for geography, ethnicity, and income group because they lacked sufficient data sources.

In fact, a recently conducted study applying the same methodology to measure diabetes prevalence in seven major cities in South America found no statistical difference in the prevalence between Barquisimeto (Venezuela), Bogotá (Colombia), Quito (Ecuador), Buenos Aires (Argentina) and Santiago (Chile) and only in Lima (Peru) there was a statistically lower prevalence [7]. This study contributed to the estimates for those countries in this edition of the IDF Diabetes Atlas, however, the prevalences reported represent only large urban cities and thus extrapolating to the varied rural populations in those countries contributes to variation and uncertainty in those estimates.

4. Urban and rural variation

On the other hand, big differences have been found within countries when comparing urban and rural settings. A recent prevalence study in Peru showed a more than two-fold difference between the prevalence of diabetes in the coastal urban population (8.2%) and the people living in suburban areas in the mountains and in the jungle (4.5% and 3.5% respectively) (Seclén S, Rosas M, Arias A, Huayta E. Prevalence of type 2 diabetes in Peru: first wave prevalence report from PERUDiab, a population-based three-wave longitudinal study. Pers Commun.; 2013). An even higher difference (five-fold) was found between an urban and a rural population in Colombia (7.8% and 1.4% respectively) [8]. These differences may be attributed to lifestyle changes occurring with urbanization, such as a more sedentary life with loss of physical fitness and dietary modifications towards more elaborated products with higher sugar content (particularly sweet beverages) and less fibre, as

Table 1 – Diabetes in the South and Central America Region [14].

	2013	2035
Adult population (20–79 years, 1000s)	300,517.42	394,161.50
Diabetes in adults (20–79 years)		
Regional prevalence (%)	8.02	9.76
Comparative prevalence (%)	8.16	8.21
Diabetes cases (1000s)	24,100.70	38,481.85
Cases undiagnosed (1000s)	5813.03	–
IGT in adults (20–79 years)		
Regional prevalence (%)	7.45	6.48
Comparative prevalence (%)	7.51	5.73
Number of people with IGT (1000s)	22,376.06	25,522.88
Type 1 diabetes in youth (0–14 years)		
Number of children with type 1 diabetes (1000s)	45.62	–
Number of newly-diagnosed (per 100,000 per year)	7.31	–
Deaths due to diabetes in adults (20–79 years)		
Total deaths due to diabetes	226,370.53	–
% of deaths under 60	44.2	–
Health expenditure		
Health expenditure due to diabetes (billion USD)	26.18	34.8

well as differences in risk factors such as obesity as demonstrated in the National Survey of Nutritional Indicators related to Chronic Diseases in Peru [9]. There may be a transition stage when the risk is high, as demonstrated comparing rural, migrant and urban populations in Peru where the mean prevalence of type 2 diabetes was 0.8%, 3% and 6% respectively [10]. Although in some countries such as Argentina, Uruguay and Venezuela more than 90% of the population is living in urban settings [1], in most of the SACA Region urbanization is evolving. There are still countries in Central America such as Guatemala, Honduras and Nicaragua, where more than 40% of the population is living in rural settings. When urbanization leads to higher education, prevalence of diabetes actually decreases [11]. As a result, interventions to avoid unhealthy lifestyle changes and preserve some of the food habits in populations migrating to cities may be an important prevention strategy to implement as well as interventions to improve access to care and education for people in rural settings.

Table 2 – Top 10 countries for prevalence[a] (%) for the South and Central America Region [14].

Country/Territory	Prevalence (%), 2013
Puerto Rico	12.98
Nicaragua	12.45
Dominican Republic	11.35
Guatemala	10.87
El Salvador	10.50
Chile	9.50
Brazil	9.19
French Guiana	8.12
Panama	8.11
Cuba	8.10

[a] Comparative prevalence.

Table 3 – Top 10 countries for prevalence (cases) for the South and Central America Region [14].

Country/Territory	Prevalence (in 1000s), 2013
Brazil	11,933.578
Colombia	2135.380
Argentina	1607.797
Chile	1253.955
Venezuela	1232.035
Cuba	814.456
Peru	786.256
Guatemala	661.047
Dominican Republic	652.870
Ecuador	530.128

5. Ethnicity and indigenous peoples

The indigenous population represents more than 5% of the total population in Honduras, Nicaragua, Panama, Ecuador and Peru and more than 40% in Guatemala and Bolivia, and there is evidence showing that this is particularly vulnerable group. For example, the Mapuches and Aymaras in Chile had the lowest prevalence of type 2 diabetes in the world (less than 1%) but increased to 8.2% and 6.9% respectively in those who were transferred from a rural to an urban environment [12]. Recently a striking 28.2% prevalence was found in the Brazilian Xavante indigenous population which has undergone important changes in the nutritional and health profile [13]. These populations have been underrepresented in most aspects of the diabetes-related research and treatment programmes and strategies to avoid the adverse impact of westernized lifestyle are urgently needed. The higher prevalence rates seen in indigenous peoples living a westernized lifestyle may be as much a product of changes in lifestyle, as a result of profound marginalization and lack of access to care and prevention.

6. Demographic transitions and future trends

The number of people with diabetes in the SACA Region has been increasing faster than the population at risk in the last decade due to urbanization as already mentioned but also due to other factors such as ageing. Prevalence of diabetes may be five to six-fold higher in people above 60 years of age when compared with people in the third decade of life, and the age pyramid is changing rapidly in the Region as mentioned in the introduction.

Most prevalence data include undiagnosed diabetes detected by the surveys, but it is the known diabetes which actively demands health care and consumes resources. Unknown cases, however, may develop more complications due to their late diagnosis which markedly increased their future cost of treatment. On average, 24% of the adult cases with diabetes in the SACA Region are undiagnosed (Table 1) but in some countries this is still as high as 50%, particularly in men. The reasons for this are likely attributed to a lack of knowledge and education among the general population but also to the lack of access to regular health care and in particular to prevention programmes.

7. Quality of diabetes care

Only a few countries in the Region have full coverage for people with diabetes including: Chile, Costa Rica, Colombia; and for a high percentage in Argentina, Uruguay, Brazil, Peru and Guatemala. Some have incorporated national screening programmes for risk factors, which lead to a higher proportion of people with known diabetes. In developing countries, most of the new cases are seen between the ages of 45 and 60 years, leading to longer life with the disease and higher exposure to complications than those developing the disease later in life. The improvement in diabetes care and in particular the increasing awareness of cardiovascular prevention may lead to less diabetes-specific mortality and there are some signs suggesting that this may be occurring in some countries of the SACA region, although still 44% of the deaths due to diabetes occur under the age of 60 years (Table 1).

In 2013, the health expenditure due to diabetes in the SACA region was 13% of the total health expenditure [14], which positions the disease as a highly significant burden. Inadequate glycemic control, defined as HbA1c >7%, is a strong predictor of complications that increase resource use in the Region as well as worldwide. In a multicenter survey done in SACA countries [15], poor glycemic control (fasting blood glucose $\geq$ 110 mg/dL) was observed in 78% of patients. The number of patients with HbA1c <7.0% was 43.2%. Glycemic control decreased significantly with increased duration of type 2 diabetes and comorbid conditions associated were observed in 86% of subjects.

Achieving treatment targets and managing diabetes are complex issues in the Region and failures are likely not due to any single factor. For example, the percentage of people with diabetes treated with insulin in two studies in the region varied from 14% to 40% according whether they are treated by general practitioners or specialists [16,17] which was less than in other regions. Participants in these studies had contact with healthcare services at least four times every year, indicating that a lack of treatment would likely not be related to poor access to care, but to other barriers. In addition, the costs related to lack of treatment and subsequent complications can be high. The expected annual rate of hospitalizations increased by a factor of 3.1 for people with poorly controlled diabetes in Latin America compared with those meeting treatment targets. Hospitalizations account for more than 50% of the cost of diabetes [17]. Inadequate glycemic control was further associated with three-fold increases in rates of inpatient days and emergency room visits [18]. Most of the hospitalizations were due to cardiovascular events which could have been prevented [19,20].

Health expenditure for diabetes in the SACA Region is comparatively low and rates of diabetes prevalence are projected to increase. Thus, a focus on the prevention of new cases and the development of costly complications is important if spending on diabetes is not increased. There is clear evidence that diabetes education implemented at every level is an efficient way to decrease costs [21,22] and a remarkable effort is needed to improve the quality of care provided to people with diabetes in the Region in order to improve outcomes and stem the epidemic. People with low socioeconomic status are at particular risk for diabetes and its consequences worldwide [23] and some studies have shown that this is also true in Latin America [24,25]. Reducing inequities may lead to lower diabetes prevalence in Latin America.

8. Modifiable risk factors for diabetes

Obesity is also epidemic in the SACA Region, and in many countries, 50% or more of the adult population has overweight or is obese. Around one-third of the adult population has metabolic syndrome according to the most recent definition using regional cutoffs for waist circumference to diagnose visceral adiposity (94 cm for men and 90 cm for women) [26]. As observed in other regions, abdominal obesity is a cardiometabolic risk factor in Latin America (which includes all the countries in the SACA region and Mexico) [27]. Obesity and metabolic syndrome are major risk factors for diabetes and lead to impaired glucose tolerance (IGT) in genetically predisposed people.

The number of people with IGT is almost equal to those with diabetes in the SACA region (Table 1), presenting an additional challenge for prevention which can be very effective in this group. Clinical trials have demonstrated that the incidence of type 2 diabetes can be halved with lifestyle intervention and the Latin American Diabetes Association (ALAD) has developed a guideline for the prevention of diabetes but it needs to be implemented [28]. A few trials are ongoing to test the feasibility of diabetes prevention programmes in the Region but efforts are still insufficient.

9. Diabetes in children and adolescents

Children (0–14 years) with type 1 diabetes represent only 0.2% of the total population with diabetes in the SACA region (Table 1) and the incidence of type 1 diabetes is low when

compared with Europe [29], although it may be increasing in relation with higher income, and urbanization as seen in a study in Chile [30]. There is almost a ten-fold difference between the incidence of type 1 diabetes in predominantly Europid, populations such as those in Argentina and Uruguay, when compared with predominantly mestizo populations in Peru which has one of the lowest incidence rates of type 1 diabetes in the world [29]. Data from Chile suggest that incidence of type 1 diabetes is also increasing in our Region [31]. People with type 1 diabetes represent an important burden for health budget because treatment by specialized multidisciplinary teams, which is essential to management of this complex disease, is scarce in the Region. Access to insulin in the Region is limited, and even when available, it is not used appropriately. A recent survey revealed that in Latin America only one out of five patients with type 1 diabetes receiving regular medical care and were achieving management targets with an HbA1c less than 7%. In fact 19% had never been tested for HbA1c and 26% did not perform regular self-monitoring of blood glucose [32]. There may be still patients with a life expectancy under 20 years after diagnosis, but reliable data is missing.

In addition, type 2 diabetes in children and adolescents is increasing. Childhood obesity is becoming a health problem in the SACA Region. Overweight was found in one third of children under the age of 6 years in a national survey in Chile [33] and type 2 diabetes in children and adolescents is increasingly recognized in the region, but data is limited to case reports. More data are urgently needed on this emerging public health problem among children and adequate lifestyle policies should be started at the school level.

10. Perspectives

Despite the diversity and large geographic area of the South and Central America Region, certain common themes emerge with respect to the diabetes epidemic. We still need to fill many gaps in the data characterizing the epidemiology of diabetes in the SACA Region and the Latin American Diabetes Epidemiology Group (GLED) has been promoting research and the training of healthcare professionals in the principles and practice of diabetes epidemiology. But we also need to act based on the available data as now provided by this new edition of the IDF Diabetes Atlas by developing National Diabetes Programs which integrate diabetes care with cardiovascular prevention and promote primary prevention as well. These strategies will help to decrease the heavy socioeconomic burden of the disease and improve the quality of life of people with diabetes.

Conflicts of interest

The authors have no conflicts of interest to disclose.

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